

136. How should you answer a radiotelephone CQ call? [2B-3-1.2]
- A. Transmit the other station's call sign at least ten times, followed by "this is," followed by your call sign at least twice
 - B. Transmit the other station's call sign at least five times phonetically, followed by "this is," followed by your call sign at least once
 - C. Transmit the other station's call sign at least three times, followed by "this is," followed by your call sign at least five times phonetically
 - D. Transmit the other station's call sign once, followed by "this is," followed by your call sign given phonetically
137. How is the call sign "KA3BGQ" stated in Standard International Phonetics? [2B-3-2.1]
- A. Kilo Alfa Three Bravo Golf Quebec
 - B. King America Three Bravo Golf Quebec
 - C. Kilowatt Alfa Three Bravo George Queen
 - D. Kilo America Three Baker Golf Quebec
138. How is the call sign "WE5TZD" stated phonetically? [2B-3-2.2]
- A. Whiskey Echo Foxtrot Tango Zulu Delta
 - B. Washington England Five Tokyo Zanzibar Denmark
 - C. Whiskey Echo Five Tango Zulu Delta
 - D. Whiskey Easy Five Tear Zebra Dog
139. How is the call sign "KC4HRM" stated phonetically? [2B-3-2.3]
- A. Kilo Charlie Four Hotel Romeo Mike
 - B. Kilowatt Charlie Four Hotel Roger Mexico
 - C. Kentucky Canada Four Honolulu Radio Mexico
 - D. King Charlie Foxtrot Hotel Roger Mary
140. How is the call sign "AF6PSQ" stated phonetically? [2B-3-2.4]
- A. America Florida Six Portugal Spain Quebec
 - B. Adam Frank Six Peter Sugar Queen
 - C. Alfa Fox Sierra Papa Santiago Queen
 - D. Alfa Foxtrot Six Papa Sierra Quebec
141. How is the call sign "NB8LXG" stated phonetically? [2B-3-2.5]
- A. November Bravo Eight Lima Xray Golf
 - B. Nancy Baker Eight Love Xray George
 - C. Norway Boston Eight London Xray Germany
 - D. November Bravo Eight London Xray Germany
142. How is the call sign "KJ1UOI" stated phonetically? [2B-3-2.6]
- A. King John One Uncle Oboe Ida
 - B. Kilowatt George India Uncle Oscar India
 - C. Kilo Juliette One Uniform Oscar India
 - D. Kentucky Juliette One United Ontario Indiana

143. How is the call sign "WV2BPZ" stated phonetically? [2B-3-2.7]
- A. Whiskey Victor Two Bravo Papa Zulu
 - B. Willie Victor Two Baker Papa Zebra
 - C. Whiskey Victor Tango Bravo Papa Zulu
 - D. Willie Virginia Two Boston Peter Zanzibar
144. How is the call sign "NY3CTJ" stated phonetically? [2B-3-2.8]
- A. Norway Yokohama Three California Tokyo Japan
 - B. Nancy Yankee Three Cat Texas Jackrabbit
 - C. Norway Yesterday Three Charlie Texas Juliette
 - D. November Yankee Three Charlie Tango Juliette
145. How is the call sign "KG7DRV" stated phonetically? [2B-3-2.9]
- A. Kilo Golf Seven Denver Radio Venezuela
 - B. Kilo Golf Seven Delta Romeo Victor
 - C. King John Seven Dog Radio Victor
 - D. Kilowatt George Seven Delta Romeo Video
146. How is the call sign "WX9HKS" stated phonetically? [2B-3-2.10]
- A. Whiskey Xray Nine Hotel Kilo Sierra
 - B. Willie Xray November Hotel King Sierra
 - C. Washington Xray Nine Honolulu Kentucky Santiago
 - D. Whiskey Xray Nine Henry King Sugar
147. How is the call sign "AE0LQY" stated phonetically? [2B-3-2.11]
- A. Able Easy Zero Lima Quebec Yankee
 - B. Arizona Equador Zero London Queen Yesterday
 - C. Alfa Echo Zero Lima Quebec Yankee
 - D. Able Easy Zero Love Queen Yoke

One (1) question should be from the following:

148. What is the format of a standard RTTY CQ call? [2B-4-1.1]
- A. Transmit the phrase "CQ" three times, followed by "DE", followed by your call sign two times
 - B. Transmit the phrase "CQ" three to six times, followed by "DE", followed by your call sign three times
 - C. Transmit the phrase "CQ" ten times, followed by the procedural signal "DE", followed by your call one time
 - D. Transmit the phrase "CQ" continuously until someone answers your call

149. You receive an RTTY CQ call at 45 bauds. At what speed should you respond? [2B-4-2.1]
- A. 22-1/2 bauds
 - B. 45 bauds
 - C. 90 bauds
 - D. Any speed, since radioteletype systems adjust to any signal rate
150. What does the term connected mean in a packet-radio link? [2B-5-1.1]
- A. A telephone link has been established between two amateurs
 - B. An amateur radio message has reached the station for local delivery
 - C. The transmitting station is sending data specifically addressed to the receiving station, and the receiving station is acknowledging that the data has been received correctly
 - D. The transmitting station and a receiving station are using a certain digipeater, so no other contacts can take place until they are finished
151. What does the term monitoring mean on a frequency used for packet radio? [2B-5-1.2]
- A. The FCC is copying all messages to determine their content
 - B. A member of the Amateur Auxiliary to the FCC's Field Operations Bureau is copying all messages to determine their content
 - C. The receiving station's video monitor is displaying all messages intended for that station, and is acknowledging correct receipt of the data
 - D. The receiving station is displaying information that may not be addressed to that station, and is not acknowledging correct receipt of the data
152. What is a digipeater? [2B-5-2.1]
- A. A packet-radio station used to retransmit data that is specifically addressed to be retransmitted by that station
 - B. An amateur radio repeater designed to retransmit all audio signals in a digital form
 - C. An amateur radio repeater designed using only digital electronics components
 - D. A packet-radio station that retransmits any signals it receives
153. What is the meaning of the term network in packet radio? [2B-5-2.2]
- A. A system of telephone lines interconnecting packet-radio stations to transfer data
 - B. A method of interconnecting packet-radio stations so that data can be transferred over long distances
 - C. The interlaced wiring on a terminal-node-controller board
 - D. The terminal-node-controller function that automatically rejects another caller when the station is connected
154. What is a good way to establish contact on a repeater? [2B-6-1.1]
- A. Give the call sign of the station you want to contact three times
 - B. Call the other operator by name and then give your call sign three times
 - C. Call the desired station and then identify your own station
 - D. Say, "Breaker, breaker," and then give your call sign
155. What is the main purpose of a repeater? [2B-6-2.1]
- A. To provide a station that makes local information available 24 hours a day
 - B. To provide a means of linking amateur stations with the telephone system
 - C. To retransmit NOAA weather information during severe storm warnings
 - D. Repeaters extend the operating range of portable and mobile stations
156. What does it mean to say that a repeater has an input and an output frequency? [2B-6-3.1]
- A. The repeater receives on one frequency and transmits on another
 - B. All repeaters offer a choice of operating frequency, in case one is busy
 - C. One frequency is used to control repeater functions and the other frequency is the one used to retransmit received signals
 - D. Repeaters require an access code to be transmitted on one frequency while your voice is transmitted on the other
157. When should simplex operation be used instead of using a repeater? [2B-6-4.1]
- A. Whenever greater communications reliability is needed
 - B. Whenever a contact is possible without using a repeater
 - C. Whenever you need someone to make an emergency telephone call
 - D. Whenever you are traveling and need some local information

158. What is an autopatch? [2B-6-5.1]
- A. A repeater feature that automatically selects the strongest signal to be repeated
 - B. An automatic system of connecting a mobile station to the next repeater as it moves out of range of the first
 - C. A device that allows repeater users to make telephone calls from their portable or mobile stations
 - D. A system that automatically locks other stations out of the repeater when there is a QSO in progress
159. What is the purpose of a repeater time-out timer? [2B-6-5.2]
- A. It allows the repeater to have a rest period after heavy use
 - B. It logs repeater transmit time to determine when the repeater mean time between failure rating is exceeded
 - C. It limits repeater transmission time to no more than ten minutes
 - D. It limits repeater transmission time to no more than three minutes

SUBELEMENT 2C - Radio-Wave Propagation (1 Question)

One (1) question should be from the following:

160. What type of radio-wave propagation occurs when the signal travels in a straight line from the transmitting antenna to the receiving antenna? [2C-1.1]
- A. Line-of-sight propagation
 - B. Straight-line propagation
 - C. Knife-edge diffraction
 - D. Tunnel propagation
161. What path do radio waves usually follow from a transmitting antenna to a receiving antenna at VHF and higher frequencies? [2C-1.2]
- A. A bent path through the ionosphere
 - B. A straight line
 - C. A great circle path over either the north or south pole
 - D. A circular path going either east or west from the transmitter
162. What type of propagation involves radio signals that travel along the surface of the Earth? [2C-2.1]
- A. Sky-wave propagation
 - B. Knife-edge diffraction
 - C. E-layer propagation
 - D. Ground-wave propagation
163. What is the meaning of the term ground-wave propagation? [2C-2.2]
- A. Signals that travel along seismic fault lines
 - B. Signals that travel along the surface of the earth
 - C. Signals that are radiated from a ground-plane antenna
 - D. Signals that are radiated from a ground station to a satellite
164. Two amateur stations a few miles apart and separated by a low hill blocking their line-of-sight path are communicating on 3.725 MHz. What type of propagation is probably being used? [2C-2.3]
- A. Tropospheric ducting
 - B. Ground wave
 - C. Meteor scatter
 - D. Sporadic E
165. When compared to sky-wave propagation, what is the usual effective range of ground-wave propagation? [2C-2.4]
- A. Much smaller
 - B. Much greater
 - C. The same
 - D. Dependent on the weather
166. What type of propagation uses radio signals refracted back to earth by the ionosphere? [2C-3.1]
- A. Sky wave
 - B. Earth-moon-earth
 - C. Ground wave
 - D. Tropospheric
167. What is the meaning of the term sky-wave propagation? [2C-3.2]
- A. Signals reflected from the moon
 - B. Signals refracted by the ionosphere
 - C. Signals refracted by water-dense cloud formations
 - D. Signals retransmitted by a repeater
168. What does the term skip mean? [2C-3.3]
- A. Signals are reflected from the moon
 - B. Signals are refracted by water-dense cloud formations
 - C. Signals are retransmitted by repeaters
 - D. Signals are refracted by the ionosphere

169. What is the area of weak signals between the ranges of ground waves and the first hop called? [2C-3.4]
- A. The skip zone
 - B. The hysteresis zone
 - C. The monitor zone
 - D. The transequatorial zone
170. What is the meaning of the term skip zone? [2C-3.5]
- A. An area covered by skip propagation
 - B. The area where a satellite comes close to the earth, and skips off the ionosphere
 - C. An area that is too far for ground-wave propagation, but too close for skip propagation
 - D. The area in the atmosphere that causes skip propagation
171. What type of radio wave propagation makes it possible for amateur stations to communicate long distances? [2C-3.6]
- A. Direct-inductive propagation
 - B. Knife-edge diffraction
 - C. Ground-wave propagation
 - D. Sky-wave propagation
172. How long is an average sunspot cycle? [2C-4.1]
- A. 2 years
 - B. 5 years
 - C. 11 years
 - D. 17 years
173. What is the term used to describe the long-term variation in the number of visible sunspots? [2C-4.2]
- A. The 11-year cycle
 - B. The Solar magnetic flux cycle
 - C. The hysteresis count
 - D. The sunspot cycle
174. What effect does the number of sunspots have on the maximum usable frequency (MUF)? [2C-5.1]
- A. The more sunspots there are, the higher the MUF will be
 - B. The more sunspots there are, the lower the MUF will be
 - C. The MUF is equal to the square of the number of sunspots
 - D. The number of sunspots effects the lowest usable frequency (LUF) but not the MUF
175. What effect does the number of sunspots have on the ionization level in the atmosphere? [2C-5.2]
- A. The more sunspots there are, the lower the ionization level will be
 - B. The more sunspots there are, the higher the ionization level will be
 - C. The ionization level of the ionosphere is equal to the square root of the number of sunspots
 - D. The ionization level of the ionosphere is equal to the square of the number of sunspots
176. Why can a VHF or UHF radio signal that is transmitted toward a mountain often be received at some distant point in a different direction? [2C-6.1]
- A. You can never tell what direction a radio wave is traveling in
 - B. These radio signals are easily bent by the ionosphere
 - C. These radio signals are easily reflected by objects in their path
 - D. These radio signals are sometimes scattered in the ectosphere
177. Why can the direction that a VHF or UHF radio signal is traveling be changed if there is a tall building in the way? [2C-6.2]
- A. You can never tell what direction a radio wave is traveling in
 - B. These radio signals are easily bent by the ionosphere
 - C. These radio signals are easily reflected by objects in their path
 - D. These radio signals are sometimes scattered in the ectosphere

SUBELEMENT 2D - Amateur Radio Practice (4 Questions)

One (1) question should be from the following:

178. How can you prevent the use of your amateur station by unauthorized persons? [2D-1.1]
- A. Install a carrier-operated relay in the main power line
 - B. Install a key-operated "ON/OFF" switch in the main power line
 - C. Post a "Danger - High Voltage" sign in the station
 - D. Install AC line fuses in the main power line
179. What is the purpose of a key-operated "ON/OFF" switch in the main power line? [2D-1.2]
- A. To prevent the use of your station by unauthorized persons
 - B. To provide an easy method for the FCC to put your station off the air
 - C. To prevent the power company from inadvertently turning off your electricity during an emergency
 - D. As a safety feature, to kill all power to the station in the event of an emergency
180. Why should all antenna and rotator cables be grounded when an amateur station is not in use? [2D-2.1]
- A. To lock the antenna system in one position
 - B. To avoid radio frequency interference
 - C. To save electricity
 - D. To protect the station and building from damage due to a nearby lightning strike
181. How can an antenna system be protected from damage caused by a nearby lightning strike? [2D-2.2]
- A. Install a balun at the antenna feed point
 - B. Install an RF choke in the feed line
 - C. Ground all antennas when they are not in use
 - D. Install a line fuse in the antenna wire
182. How can amateur station equipment be protected from damage caused by voltage induced in the power lines by a nearby lightning strike? [2D-2.3]
- A. Use heavy insulation on the wiring
 - B. Keep the equipment on constantly
 - C. Disconnect the ground system
 - D. Disconnect all equipment after use, either by unplugging or by using a main disconnect switch

183. For proper protection from lightning strikes, what equipment should be grounded in an amateur station? [2D-2.4]

- A. The power supply primary
- B. All station equipment
- C. The feed line center conductors
- D. The AC power mains

184. What is a convenient indoor grounding point for an amateur station? [2D-3.1]

- A. A metallic cold water pipe
- B. PVC plumbing
- C. A window screen
- D. A natural gas pipe

185. To protect against electrical shock hazards, what should you connect the chassis of each piece of your equipment to? [2D-3.2]

- A. Insulated shock mounts
- B. The antenna
- C. A good ground connection
- D. A circuit breaker

186. What type of material should a driven ground rod be made of? [2D-3.3]

- A. Ceramic or other good insulator
- B. Copper or copper-clad steel
- C. Iron or steel
- D. Fiberglass

187. What is the shortest ground rod you should consider installing for your amateur station RF ground? [2D-3.4]

- A. 4 foot
- B. 6 foot
- C. 8 foot
- D. 10 foot

One (1) question should be from the following:

188. What precautions should you take when working with 1270-MHz waveguide? [2D-4.1]

- A. Make sure that the RF leakage filters are installed at both ends of the waveguide
- B. Never look into the open end of a waveguide when RF is applied
- C. Minimize the standing wave ratio before you test the waveguide
- D. Never have both ends of the waveguide open at the same time when RF is applied

189. What precautions should you take when you mount a UHF antenna in a permanent location? [2D-4.2]
- A. Make sure that no one can be near the antenna when you are transmitting
 - B. Make sure that the RF field screens are in place
 - C. Make sure that the antenna is near the ground to maximize directional effect
 - D. Make sure you connect an RF leakage filter at the antenna feed point
190. What precautions should you take before removing the shielding on a UHF power amplifier? [2D-4.3]
- A. Make sure all RF screens are in place at the antenna
 - B. Make sure the feed line is properly grounded
 - C. Make sure the amplifier cannot be accidentally energized
 - D. Make sure that the RF leakage filters are connected
191. Why should you use only good-quality, well-constructed coaxial cable and connectors for a UHF antenna system? [2D-4.4]
- A. To minimize RF leakage
 - B. To reduce parasitic oscillations
 - C. To maximize the directional characteristics of your antenna
 - D. To maximize the standing wave ratio of the antenna system
192. Why should you be careful to position the antenna of your 220-MHz hand-held transceiver away from your head when you are transmitting? [2D-4.5]
- A. To take advantage of the directional effect
 - B. To minimize RF exposure
 - C. To use your body to reflect the signal, improving the directional characteristics of the antenna
 - D. To minimize static discharges
193. Which of the following types of radiation produce health risks most like the risks produced by radio frequency radiation? [2D-4.6]
- A. Microwave oven radiation and ultraviolet radiation
 - B. Microwave oven radiation and radiation from an electric space heater
 - C. Radiation from Uranium or Radium and ultraviolet radiation
 - D. Sunlight and radiation from an electric space heater
194. Why is there a switch that turns off the power to a high-voltage power supply if the cabinet is opened? [2D-5.1]
- A. To prevent RF from escaping from the supply
 - B. To prevent RF from entering the supply through the open cabinet
 - C. To provide a way to turn the power supply on and off
 - D. To reduce the danger of electrical shock
195. What purpose does a safety interlock on an amateur transmitter serve? [2D-5.2]
- A. It reduces the danger that the operator will come in contact with dangerous high voltages when the cabinet is opened while the power is on
 - B. It prevents the transmitter from being turned on accidentally
 - C. It prevents RF energy from leaking out of the transmitter cabinet
 - D. It provides a way for the station licensee to ensure that only authorized operators can turn the transmitter on
196. What type of safety equipment should you wear when you are working at the top of an antenna tower? [2D-6.1]
- A. A grounding chain
 - B. A reflective vest
 - C. Loose clothing
 - D. A carefully inspected safety belt
197. Why should you wear a safety belt when you are working at the top of an antenna tower? [2D-6.2]
- A. To provide a way to safely hold your tools so they don't fall and injure someone on the ground
 - B. To maintain a balanced load on the tower while you are working
 - C. To provide a way to safely bring tools up and down the tower
 - D. To prevent an accidental fall
198. For safety purposes, how high should you locate all portions of your horizontal wire antenna? [2D-6.3]
- A. High enough so that a person cannot touch them from the ground
 - B. Higher than chest level
 - C. Above knee level
 - D. Above electrical lines

199. What type of safety equipment should you wear when you are on the ground assisting someone who is working on an antenna tower? [2D-6.4]

- A. A reflective vest
- B. A safety belt
- C. A grounding chain
- D. A hard hat

200. Why should you wear a hard hat when you are on the ground assisting someone who is working on an antenna tower? [2D-6.5]

- A. To avoid injury from tools dropped from the tower
- B. To provide an RF shield during antenna testing
- C. To avoid injury if the tower should accidentally collapse
- D. To avoid injury from walking into tower guy wires

One (1) question should be from the following:

201. What accessory is used to measure standing wave ratio? [2D-7-1.1]

- A. An ohm meter
- B. An ammeter
- C. An SWR meter
- D. A current bridge

202. What instrument is used to indicate the relative impedance match between a transmitter and antenna? [2D-7-1.2]

- A. An ammeter
- B. An ohmmeter
- C. A voltmeter
- D. An SWR meter

203. What does an SWR-meter reading of 1:1 indicate? [2D-7-2.1]

- A. An antenna designed for use on another frequency band is probably connected
- B. An optimum impedance match has been attained
- C. No power is being transferred to the antenna
- D. An SWR meter never indicates 1:1 unless it is defective

204. What does an SWR-meter reading of less than 1.5:1 indicate? [2D-7-2.2]

- A. An unacceptably low reading
- B. An unacceptably high reading
- C. An acceptable impedance match
- D. An antenna gain of 1.5

205. What does an SWR-meter reading of 4:1 indicate? [2D-7-2.3]

- A. An unacceptably low reading
- B. An acceptable impedance match
- C. An antenna gain of 4
- D. An impedance mismatch, which is not acceptable; it indicates problems with the antenna system

206. What does an SWR-meter reading of 5:1 indicate? [2D-7-2.4]

- A. The antenna will make a 10-watt signal as strong as a 50-watt signal
- B. Maximum power is being delivered to the antenna
- C. An unacceptable mismatch is indicated
- D. A very desirable impedance match has been attained

207. What kind of SWR-meter reading may indicate poor electrical contact between parts of an antenna system? [2D-7-3.1]

- A. An erratic reading
- B. An unusually low reading
- C. No reading at all
- D. A negative reading

208. What does an unusually high SWR-meter reading indicate? [2D-7-3.2]

- A. That the antenna is not the correct length, or that there is an open or shorted connection somewhere in the feed line
- B. That the signals arriving at the antenna are unusually strong, indicating good radio conditions
- C. That the transmitter is producing more power than normal, probably indicating that the final amplifier tubes or transistors are about to go bad
- D. That there is an unusually large amount of solar white-noise radiation, indicating very poor radio conditions

209. The SWR-meter reading at the low-frequency end of an amateur band is 2.5:1, and the SWR-meter reading at the high-frequency end of the same band is 5:1. What does this indicate about your antenna? [2D-7-3.3]

- A. The antenna is broadbanded
- B. The antenna is too long for operation on this band
- C. The antenna is too short for operation on this band
- D. The antenna has been optimized for operation on this band

210. The SWR-meter reading at the low-frequency end of an amateur band is 5:1, and the SWR-meter reading at the high-frequency end of the same band is 2.5:1. What does this indicate about your antenna? [2D-7-3.4]

- A. The antenna is broadbanded
- B. The antenna is too long for operation on this band
- C. The antenna is too short for operation on this band
- D. The antenna has been optimized for operation on this band

One (1) question should be from the following:

211. What is meant by receiver overload? [2D-8-1.1]

- A. Interference caused by transmitter harmonics
- B. Interference caused by overcrowded band conditions
- C. Interference caused by strong signals from a nearby transmitter
- D. Interference caused by turning the receiver volume too high

212. What is a likely indication that radio-frequency interference to a receiver is caused by front-end overload? [2D-8-1.2]

- A. A low pass filter at the transmitter reduces interference sharply
- B. The interference is independent of frequency
- C. A high pass filter at the receiver reduces interference little or not at all
- D. Grounding the receiver makes the problem worse

213. Your neighbor reports interference to his television whenever you are transmitting from your amateur station. This interference occurs regardless of your transmitter frequency. What is likely to be the cause of the interference? [2D-8-1.3]

- A. Inadequate transmitter harmonic suppression
- B. Receiver VR tube discharge
- C. Receiver overload
- D. Incorrect antenna length

214. What type of filter should be installed on a TV receiver as the first step in preventing RF overload from an amateur HF station transmission? [2D-8-1.4]

- A. Low pass
- B. High pass
- C. Band pass
- D. Notch

215. What is meant by harmonic radiation? [2D-8-2.1]

- A. Transmission of signals at whole number multiples of the fundamental (desired) frequency
- B. Transmission of signals that include a superimposed 60-Hz hum
- C. Transmission of signals caused by sympathetic vibrations from a nearby transmitter
- D. Transmission of signals to produce a stimulated emission in the air to enhance skip propagation

216. Why is harmonic radiation from an amateur station undesirable? [2D-8-2.2]

- A. It will cause interference to other stations and may result in out-of-band signal radiation
- B. It uses large amounts of electric power
- C. It will cause sympathetic vibrations in nearby transmitters
- D. It will produce stimulated emission in the air above the transmitter, thus causing aurora

217. What type of interference may radiate from a multi-band antenna connected to an improperly tuned transmitter? [2D-8-2.3]

- A. Harmonic radiation
- B. Auroral distortion
- C. Parasitic excitation
- D. Intermodulation

218. What is the purpose of shielding in a transmitter? [2D-8-2.4]

- A. It gives the low pass filter structural stability
- B. It enhances the microphonic tendencies of radiotelephone transmitters
- C. It prevents unwanted RF radiation
- D. It helps maintain a sufficiently high operating temperature in circuit components

219. Your neighbor reports interference on one or two channels of her television when you are transmitting from your amateur station. This interference only occurs when you are operating on 15 meters. What is likely to be the cause of the interference? [2D-8-2.5]

- A. Excessive low-pass filtering on the transmitter
- B. Sporadic E de-ionization near your neighbor's TV antenna
- C. TV Receiver front-end overload
- D. Harmonic radiation from your transmitter

220. What type of filter should be installed on an amateur transmitter as the first step in reducing harmonic radiation? [2D-8-2.6]

- A. Key click filter
- B. Low pass filter
- C. High pass filter
- D. CW filter

221. If you are notified that your amateur station is causing television interference, what should you do first? [2D-8-3.1]

- A. Make sure that your amateur equipment is operating properly, and that it does not cause interference to your own television
- B. Immediately turn off your transmitter and contact the nearest FCC office for assistance
- C. Install a high-pass filter at the transmitter output and a low-pass filter at the antenna-input terminals of the TV
- D. Continue operating normally, since you have no legal obligation to reduce or eliminate the interference

222. Your neighbor informs you that you are causing television interference, but you are sure your amateur equipment is operating properly and you cause no interference to your own TV. What should you do? [2D-8-3.2]

- A. Immediately turn off your transmitter and contact the nearest FCC office for assistance
- B. Work with your neighbor to determine that you are actually the cause of the interference
- C. Install a high-pass filter at the transmitter output and a low-pass filter at the antenna-input terminals of the TV
- D. Continue operating normally, since you have no legal obligation to reduce or eliminate the interference

SUBELEMENT 2E - Electrical Principles (4 questions)

One (1) question should be from the following:

223. Your receiver dial is calibrated in megahertz and shows a signal at 1200 MHz. At what frequency would a dial calibrated in gigahertz show the signal? [2E-1-1.1]

- A. 1,200,000 GHz
- B. 12 GHz
- C. 1.2 GHz
- D. 0.0012 GHz

224. Your receiver dial is calibrated in kilohertz and shows a signal at 7125 kHz. At what frequency would a dial calibrated in megahertz show the signal? [2E-1-2.1]

- A. 0.007125 MHz
- B. 7.125 MHz
- C. 71.25 MHz
- D. 7,125,000 MHz

225. Your receiver dial is calibrated in gigahertz and shows a signal at 1.2 GHz. At what frequency would a dial calibrated in megahertz show the same signal? [2E-1-2.2]

- A. 1.2 MHz
- B. 12 MHz
- C. 120 MHz
- D. 1200 MHz

226. Your receiver dial is calibrated in megahertz and shows a signal at 3.525 MHz. At what frequency would a dial calibrated in kilohertz show the signal? [2E-1-3.1]

- A. 0.003525 kHz
- B. 3525 kHz
- C. 35.25 kHz
- D. 3,525,000 kHz

227. Your receiver dial is calibrated in kilohertz and shows a signal at 3725 kHz. At what frequency would a dial calibrated in Hertz show the same signal? [2E-1-3.2]

- A. 3,725 Hz
- B. 3.725 Hz
- C. 37.25 Hz
- D. 3,725,000 Hz

228. How long (in meters) is an antenna that is 400 centimeters long? [2E-1-4.1]

- A. 0.0004 meters
- B. 4 meters
- C. 40 meters
- D. 40,000 meters

229. What reading will be displayed on a meter calibrated in amperes when it is being used to measure a 3000-milliamperes current? [2E-1-5.1]

- A. 0.003 amperes
- B. 0.3 amperes
- C. 3 amperes
- D. 3,000,000 amperes

230. What reading will be displayed on a meter calibrated in volts when it is being used to measure a 3500-millivolt potential? [2E-1-5.2]

- A. 350 volts
- B. 35 volts
- C. 3.5 volts
- D. 0.35 volts

231. How many farads is 500,000 microfarads? [2E-1-6.1]

- A. 0.0005 farads
- B. 0.5 farads
- C. 500 farads
- D. 500,000,000 farads

232. How many microfarads is 1,000,000 picofarads? [2E-1-7.1]

- A. 0.001 microfarads
- B. 1 microfarad
- C. 1,000 microfarads
- D. 1,000,000,000 microfarads

One (1) question should be from the following:

233. What is the term used to describe the flow of electrons in an electric circuit? [2E-2-1.1]

- A. Voltage
- B. Resistance
- C. Capacitance
- D. Current

234. What is the basic unit of electric current? [2E-2-2.1]

- A. The volt
- B. The watt
- C. The ampere
- D. The ohm

235. What supplies the force that will cause electrons to flow through a circuit? [2E-3-1.1]

- A. Electromotive force, or voltage
- B. Magnetomotive force, or inductance
- C. Farad force, or capacitance
- D. Thermodynamic force, or entropy

236. The pressure in a water pipe is comparable to what force in an electrical circuit? [2E-3-1.2]

- A. Current
- B. Resistance
- C. Gravitation
- D. Voltage

237. An electric circuit must connect to two terminals of a voltage source. What are these two terminals called? [2E-3-1.3]

- A. The north and south poles
- B. The positive and neutral terminals
- C. The positive and negative terminals
- D. The entrance and exit terminals

238. What is the basic unit of voltage? [2E-3-2.1]

- A. The volt
- B. The watt
- C. The ampere
- D. The ohm

239. List at least three good electrical conductors. [2E-4.1]

- A. Copper, gold, mica
- B. Gold, silver, wood
- C. Gold, silver, aluminum
- D. Copper, aluminum, paper

240. List at least four good electrical insulators. [2E-5.1]

- A. Glass, air, plastic, porcelain
- B. Glass, wood, copper, porcelain
- C. Paper, glass, air, aluminum
- D. Plastic, rubber, wood, carbon

241. There is a limit to the electric current that can pass through any material. What is this current limiting called? [2E-6-1.1]

- A. Fusing
- B. Reactance
- C. Saturation
- D. Resistance

242. What is an electrical component called that opposes electron movement through a circuit? [2E-6-1.2]

- A. A resistor
- B. A reactor
- C. A fuse
- D. An oersted

243. What is the basic unit of resistance? [2E-6-2.1]

- A. The volt
- B. The watt
- C. The ampere
- D. The ohm

One (1) question should be from the following:

244. What electrical principle relates voltage, current and resistance in an electric circuit? [2E-7.1]

- A. Ampere's Law
- B. Kirchhoff's Law
- C. Ohm's Law
- D. Tesla's Law

245. There is a 2-amp current through a 50-ohm resistor. What is the applied voltage? [2E-7.2]

- A. 0.04 volts
- B. 52 volts
- C. 100 volts
- D. 200 volts

246. If 200 volts is applied to a 100-ohm resistor, what is the current through the resistor? [2E-7.3]

- A. 0.5 amps
- B. 2 amps
- C. 50 amps
- D. 20000 amps

247. There is a 3-amp current through a resistor and we know that the applied voltage is 90 volts. What is the value of the resistor? [2E-7.4]

- A. 0.03 ohms
- B. 10 ohms
- C. 30 ohms
- D. 2700 ohms

248. What is the term used to describe the ability to do work? [2E-8.1]

- A. Voltage
- B. Power
- C. Inertia
- D. Energy

249. What is converted to heat and light in an electric light bulb? [2E-8.2]

- A. Electrical energy
- B. Electrical voltage
- C. Electrical power
- D. Electrical current

250. What term is used to describe the rate of energy consumption? [2E-9-1.1]

- A. Energy
- B. Current
- C. Power
- D. Voltage

251. You have two lamps with different wattage light bulbs in them. How can you determine which bulb uses electrical energy faster? [2E-9-1.2]

- A. The bulb that operates from the higher voltage will consume energy faster
- B. The physically larger bulb will consume energy faster
- C. The bulb with the higher wattage rating will consume energy faster
- D. The bulb with the lower wattage rating will consume energy faster

252. What is the basic unit of electrical power? [2E-9-2.1]

- A. Ohm
- B. Watt
- C. Volt
- D. Ampere

253. What is the term for an electrical circuit in which there can be no current? [2E-10.1]

- A. A closed circuit
- B. A short circuit
- C. An open circuit
- D. A hyper circuit

254. What is the term for a failure in an electrical circuit that causes excessively high current? [2E-11.1]

- A. An open circuit
- B. A dead circuit
- C. A closed circuit
- D. A short circuit

One (1) question should be from the following:

255. What is the term used to describe a current that flows only in one direction? [2E-12-1.1]

- A. Alternating current
- B. Direct current
- C. Periodic current
- D. Pulsating current

256. What is the term used to describe a current that flows first in one direction, then in the opposite direction, over and over? [2E-12-2.1]

- A. Alternating current
- B. Direct current
- C. Negative current
- D. Positive current

257. What is the term for the number of complete cycles of an alternating waveform that occur in one second? [2E-12-3.1]

- A. Pulse repetition rate
- B. Hertz
- C. Frequency per wavelength
- D. Frequency

258. A certain AC signal makes 2000 complete cycles in one second. What property of the signal does this number describe? [2E-12-3.2]
- A. The frequency of the signal
 - B. The pulse repetition rate of the signal
 - C. The wavelength of the signal
 - D. The hertz per second of the signal
259. What is the basic unit of frequency? [2E-12-3.3]
- A. The hertz
 - B. The cycle
 - C. The kilohertz
 - D. The megahertz
260. What range of frequencies are usually called audio frequencies? [2E-12-4.1]
- A. 0 to 20 Hz
 - B. 20 to 20,000 Hz
 - C. 200 to 200,000 Hz
 - D. 10,000 to 30,000 Hz
261. A signal at 725 Hz is in what frequency range? [2E-12-4.2]
- A. Audio frequency
 - B. Intermediate frequency
 - C. Microwave frequency
 - D. Radio frequency
262. Why do we call signals in the range 20 Hz to 20,000 Hz audio frequencies? [2E-12-4.3]
- A. Because the human ear rejects signals in this frequency range
 - B. Because the human ear responds to sounds in this frequency range
 - C. Because frequencies in this range are too low for a radio to detect
 - D. Because a radio converts signals in this range directly to sounds the human ear responds to
263. Signals above what frequency are usually called radio-frequency signals? [2E-12-5.1]
- A. 20 Hz
 - B. 2000 Hz
 - C. 20,000 Hz
 - D. 1,000,000 Hz
264. A signal at 7125 kHz is in what frequency range? [2E-12-5.2]
- A. Audio frequency
 - B. Radio frequency
 - C. Hyper-frequency
 - D. Super-high frequency
265. What is the term for the distance an AC signal travels during one complete cycle? [2E-13.1]
- A. Wave velocity
 - B. Velocity factor
 - C. Wavelength
 - D. Wavelength per meter
266. In the time it takes a certain radio signal to pass your antenna, the leading edge of the wave travels 12 meters. What property of the signal does this number refer to? [2E-13.2]
- A. The signal frequency
 - B. The wave velocity
 - C. The velocity factor
 - D. The signal wavelength

SUBELEMENT 2F - Circuit Components (2 Questions)

One (1) question should be from the following:

267. What is the symbol used on schematic diagrams to represent a resistor? (Please refer to Diagram 2F-1.1) [2F-1.1]
- A. Symbol A
 - B. Symbol B
 - C. Symbol C
 - D. Symbol D
268. What is the symbol used on schematic diagrams to represent a variable resistor or potentiometer? (Please refer to Diagram 2F-1.2) [2F-1.2]
- A. Symbol A
 - B. Symbol B
 - C. Symbol C
 - D. Symbol D

269. In Diagram 2F-1, which component is a resistor? [2F-1.3]

- A. 1
- B. 2
- C. 3
- D. 4

270. What is the symbol used on schematic diagrams to represent a single-pole, single-throw switch? (Please refer to Diagram 2F-2.1) [2F-2.1]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

271. What is the symbol used on schematic diagrams to represent a single-pole, double-throw switch? (Please refer to Diagram 2F-2.2) [2F-2.2]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

272. What is the symbol used on schematic diagrams to represent a double-pole, double-throw switch? (Please refer to Diagram 2F-2.3) [2F-2.3]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

273. What is the symbol used on schematic diagrams to represent a single-pole 5-position switch? (Please refer to Diagram 2F-2.4) [2F-2.4]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

274. In Diagram 2F-2, which component is a switch? [2F-2.5]

- A. 1
- B. 2
- C. 3
- D. 4

275. What is the symbol used on schematic diagrams to represent a fuse? (Please refer to Diagram 2F-3.1) [2F-3.1]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

276. What is the symbol used on schematic diagrams to represent a single-cell battery? (Please refer to Diagram 2F-4.1) [2F-4.1]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

277. What is the symbol used on schematic diagrams to represent a multiple-cell battery? (Please refer to Diagram 2F-4.2) [2F-4.2]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

One (1) question should be from the following:

278. What is the symbol normally used to represent an earth-ground connection on schematic diagrams? (Please refer to Diagram 2F-5.1) [2F-5.1]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

279. What is the symbol normally used to represent a chassis-ground connection on schematic diagrams? (Please refer to Diagram 2F-5.2) [2F-5.2]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

280. In Diagram 2F-5, which symbol represents a chassis ground connection? [2F-5.3]

- A. 1
- B. 2
- C. 3
- D. 4

281. In Diagram 2F-5, which symbol represents an earth ground connection? [2F-5.4]

- A. 1
- B. 2
- C. 3
- D. 4

282. What is the symbol used to represent an antenna on schematic diagrams? (Please refer to Diagram 2F-6.1) [2F-6.1]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

283. What is the symbol used to represent an NPN bipolar transistor on schematic diagrams? (Please refer to Diagram 2F-7.1) [2F-7.1]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

284. What is the symbol used to represent a PNP bipolar transistor on schematic diagrams? (Please refer to Diagram 2F-7.2) [2F-7.2]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

285. In Diagram 2F-7, which symbol represents a PNP bipolar transistor? [2F-7.3]

- A. 1
- B. 2
- C. 3
- D. 4

286. In Diagram 2F-7, which symbol represents an NPN bipolar transistor? [2F-7.4]

- A. 1
- B. 2
- C. 3
- D. 4

287. What is the symbol used to represent a triode vacuum tube on schematic diagrams? (Please refer to Diagram 2F-8.1) [2F-8.1]

- A. Symbol A
- B. Symbol B
- C. Symbol C
- D. Symbol D

SUBELEMENT 2G - Practical Circuits (2 Questions)

One (1) question should be from the following:

288. What is the unlabeled block (?) in this diagram? (Please refer to Diagram 2G-1-1.1) [2G-1-1.1]

- A. A terminal-node controller
- B. An antenna switch
- C. A telegraph key
- D. A TR switch

289. What is the unlabeled block (?) in this diagram? (Please refer to Diagram 2G-1-1.2) [2G-1-1.2]

- A. A microphone
- B. A receiver
- C. A transmitter
- D. An SWR meter

290. What is the unlabeled block (?) in this diagram? (Please refer to Diagram 2G-1-1.3) [2G-1-1.3]

- A. A key click filter
- B. An antenna tuner
- C. A power supply
- D. A receiver

291. What is the unlabeled block (?) in this diagram? (Please refer to Diagram 2G-1-1.4) [2G-1-1.4]

- A. A transceiver
- B. A TR switch
- C. An antenna tuner
- D. A modem

292. In block diagram 2G-1, which symbol represents an antenna? [2G-1-1.5]

- A. 1
- B. 2
- C. 3
- D. 4

293. What is the unlabeled block (?) in this diagram? (Please refer to Diagram 2G-1-2.1) [2G-1-2.1]

- A. A pi network
- B. An antenna switch
- C. A key click filter
- D. A mixer

294. What is the unlabeled block (?) in this diagram? (Please refer to Diagram 2G-1-2.2) [2G-1-2.2]

- A. A TR switch
- B. A variable frequency oscillator
- C. A linear amplifier
- D. A microphone

295. What is the unlabeled block (?) in this diagram? (Please refer to Diagram 2G-1-2.3) [2G-1-2.3]

- A. An antenna switch
- B. An impedance-matching network
- C. A key click filter
- D. A terminal-node controller

296. In block diagram 2G-1, if component 1 is a transceiver and component 2 is an SWR meter, what is component 3? [2G-1-2.4]

- A. A power supply
- B. A receiver
- C. A microphone
- D. An impedance matching device

297. In block diagram 2G-1, if component 2 is an SWR meter and component 3 is an impedance matching device, what is component 1? [2G-1-2.5]

- A. A power supply
- B. An antenna
- C. An antenna switch
- D. A transceiver

One (1) question should be from the following:

298. In an amateur station designed for Morse radiotelegraph operation, what station accessory will you need to go with your transmitter? [2G-2.1]

- A. A terminal-node controller
- B. A telegraph key
- C. An SWR meter
- D. An antenna switch

299. What is the unlabeled block (?) in this diagram of a Morse telegraphy station? (Please refer to Diagram 2G-2.2) [2G-2.2]

- A. A sidetone oscillator
- B. A microphone
- C. A telegraph key
- D. A DTMF keypad

300. What station accessory do many amateurs use to help form good Morse code characters? [2G-2.3]

- A. A sidetone oscillator
- B. A key-click filter
- C. An electronic keyer
- D. A DTMF keypad

301. In an amateur station designed for radiotelephone operation, what station accessory will you need to go with your transmitter? [2G-3.1]

- A. A splatter filter
- B. A terminal-voice controller
- C. A receiver audio filter
- D. A microphone

302. What is the unlabeled block (?) in this diagram of a radiotelephone station? (Please refer to Diagram 2G-3.2) [2G-3.2]

- A. A splatter filter
- B. A terminal-voice controller
- C. A receiver audio filter
- D. A microphone

303. In an amateur station designed for radiotele-type operation, what station accessories will you need to go with your transmitter? [2G-4.1]

- A. A modem and a teleprinter or computer system
- B. A computer, a printer and a RTTY refresh unit
- C. A terminal-node controller
- D. A modem, a monitor and a DTMF keypad

304. What is the unlabeled block (?) in this diagram? (Please refer to Diagram 2G-4.2) [2G-4.2]

- A. An RS-232 interface
- B. SWR bridge
- C. Modem
- D. Terminal-network controller

305. In a packet-radio station, what device connects between the radio transceiver and the computer terminal? [2G-5.1]

- A. A terminal-node controller
- B. An RS-232 interface
- C. A terminal refresh unit
- D. A tactical network control system

306. What is the unlabeled block (?) in this diagram of a packet-radio station? (Please refer to Diagram 2G-5.2) [2G-5.2]

- A. A terminal-node controller
- B. An RS-232 interface
- C. A terminal refresh unit
- D. A tactical network control system

307. Where does a terminal-node controller connect in an amateur packet-radio station? [2G-5.3]

- A. Between the antenna and the radio
- B. Between the computer and the monitor
- C. Between the computer or terminal and the radio
- D. Between the keyboard and the computer

SUBELEMENT 2H - Signals and Emissions (2 Questions)

One (1) question should be from the following:

308. What keying method is used to transmit CW? [2H-1-1.1]
- A. Frequency-shift keying of a radio-frequency signal
 - B. On/off keying of a radio-frequency signal
 - C. Audio-frequency-shift keying of an oscillator tone
 - D. On/off keying of an audio-frequency signal
309. What emission type describes international Morse code telegraphy messages? [2H-1-1.2]
- A. RTTY
 - B. Image
 - C. CW
 - D. Phone
310. What emission type describes narrow-band direct-printing telegraphy emissions? [2H-1-2.1]
- A. RTTY
 - B. Image
 - C. CW
 - D. Phone
311. What keying method is used to transmit RTTY messages? [2H-1-2.2]
- A. Frequency-shift keying of a radio-frequency signal
 - B. On/off keying of a radio-frequency signal
 - C. Digital pulse-code keying of an unmodulated carrier
 - D. On/off keying of an audio-frequency signal
312. What emission type describes frequency-modulated voice transmissions? [2H-1-3.1]
- A. FM phone
 - B. Image
 - C. CW
 - D. Single-sideband phone
313. What emission type describes single-sideband suppressed-carrier (SSB) voice transmissions? [2H-1-4.1]
- A. FM phone
 - B. Image
 - C. CW
 - D. Sideband phone
314. What does the term key click mean? [2H-2.1]
- A. The mechanical noise caused by closing a straight key too hard
 - B. The clicking noise from an excessively square CW keyed waveform
 - C. The sound produced in a receiver from a CW signal faster than 20 WPM
 - D. The sound of a CW signal being copied on an AM receiver
315. How can key clicks be eliminated? [2H-2.2]
- A. By reducing your keying speed to less than 20 WPM
 - B. By increasing power to the maximum allowable level
 - C. By using a power supply with better regulation
 - D. By using a key-click filter
316. What does the term chirp mean? [2H-3.1]
- A. A distortion in the receiver audio circuits
 - B. A high-pitched audio tone transmitted with a CW signal
 - C. A slight shift in oscillator frequency each time a CW transmitter is keyed
 - D. A slow change in transmitter frequency as the circuit warms up
317. What can be done to the power supply of a CW transmitter to avoid chirp? [2H-3.2]
- A. Resonate the power supply filters
 - B. Regulate the power supply output voltages
 - C. Use a buffer amplifier between the transmitter output and the feed line
 - D. Hold the power supply current to a fixed value
318. What is a common cause of superimposed hum? [2H-4.1]
- A. Using a nonresonant random-wire antenna
 - B. Sympathetic vibrations from a nearby transmitter
 - C. Improper neutralization of the transmitter output stage
 - D. A defective filter capacitor in the power supply
319. What type of problem can a bad power-supply filter capacitor cause in a transmitter or receiver? [2H-4.2]
- A. Sympathetic vibrations in nearby receivers
 - B. A superimposed hum or buzzing sound
 - C. Extreme changes in antenna resonance
 - D. Imbalance in the mixers

One (1) question should be from the following:

320. What is the 4th harmonic of a 7160-kHz signal? [2H-5.1]

- A. 28,640 kHz
- B. 35,800 kHz
- C. 28,160 kHz
- D. 1790 kHz

321. You receive an FCC Notice of Violation stating that your station was heard on 21,375 kHz. At the time listed on the notice, you were operating on 7125 kHz. What is a possible cause of this violation? [2H-5.2]

- A. Your transmitter has a defective power-supply filter capacitor
- B. Your CW keying speed was excessively fast
- C. Your transmitter was radiating excess harmonic signals
- D. Your transmitter has a defective power-supply filter choke

322. What may happen to body tissues that are exposed to large amounts of UHF or microwave RF energy? [2H-6.1]

- A. The tissue may be damaged because of the heat produced
- B. The tissue may suddenly be frozen
- C. The tissue may be immediately destroyed because of the Maxwell Effect
- D. The tissue may become less resistant to cosmic radiation

323. What precaution should you take before working near a high-gain UHF or microwave antenna (such as a parabolic, or dish antenna)? [2H-6.2]

- A. Be certain the antenna is FCC type accepted
- B. Be certain the antenna and transmitter are properly grounded
- C. Be certain the transmitter cannot be operated
- D. Be certain the antenna safety interlocks are in place

324. You are installing a VHF or UHF mobile radio in your vehicle. What is the best location to mount the antenna on the vehicle to minimize any danger from RF exposure to the driver or passengers? [2H-6.3]

- A. In the middle of the roof
- B. Along the top of the windshield
- C. On either front fender
- D. On the trunk lid

325. You discover that your tube-type transmitter power amplifier is radiating spurious emissions. What is the most likely cause of this problem? [2H-7.1]

- A. Excessively fast keying speed
- B. Undermodulation
- C. Improper neutralization
- D. Tank-circuit current dip at resonance

326. Your transmitter radiates signals outside the amateur band where you are transmitting. What term describes this radiation? [2H-7.2]

- A. Off-frequency emissions
- B. Transmitter chirp
- C. Incidental radiation
- D. Spurious emissions

327. What problem can occur if you operate your transmitter without the cover and other shielding in place? [2H-7.3]

- A. Your transmitter can radiate spurious emissions
- B. Your transmitter may radiate a "chirpy" signal
- C. The final amplifier efficiency of your transmitter may decrease
- D. You may cause splatter interference to other stations operating on nearby frequencies

328. What type of interference will you cause if you operate your SSB transmitter with the microphone gain adjusted too high? [2H-7.4]

- A. You may cause digital interference to computer equipment in your neighborhood
- B. You may cause splatter interference to other stations operating on nearby frequencies
- C. You may cause atmospheric interference in the air around your antenna
- D. You may cause processor interference to the microprocessor in your rig

329. What may happen if you adjust the microphone gain or deviation control on your FM transmitter too high? [2H-7.5]

- A. You may cause digital interference to computer equipment in your neighborhood
- B. You may cause interference to other stations operating on nearby frequencies
- C. You may cause atmospheric interference in the air around your antenna
- D. You may cause processor interference to the microprocessor in your rig

330. What type of interference can excessive amounts of speech processing in your SSB transmitter cause? [2H-7.6]

- A. You may cause digital interference to computer equipment in your neighborhood
- B. You may cause splatter interference to other stations operating on nearby frequencies
- C. You may cause atmospheric interference in the air around your antenna
- D. You may cause processor interference to the microprocessor in your rig

SUBELEMENT 2I - Antennas and Feed Lines (3 Questions)

One (1) question should be from the following:

331. What is the approximate length (in feet) of a half-wavelength dipole antenna for 3725 kHz? [2I-1.1]

- A. 126 ft
- B. 81 ft
- C. 63 ft
- D. 40 ft

332. What is the approximate length (in feet) of a half-wavelength dipole antenna for 7125 kHz? [2I-1.2]

- A. 84 ft
- B. 42 ft
- C. 33 ft
- D. 66 ft

333. What is the approximate length (in feet) of a half-wavelength dipole antenna for 21,125 kHz? [2I-1.3]

- A. 44 ft
- B. 28 ft
- C. 22 ft
- D. 14 ft

334. What is the approximate length (in feet) of a half-wavelength dipole antenna for 28,150 kHz? [2I-1.4]

- A. 22 ft
- B. 11 ft
- C. 17 ft
- D. 34 ft

335. How is the approximate length (in feet) of a half-wavelength dipole antenna calculated? [2I-1.5]

- A. By substituting the desired operating frequency for f in the formula: $150 / f$ (in MHz)
- B. By substituting the desired operating frequency for f in the formula: $234 / f$ (in MHz)
- C. By substituting the desired operating frequency for f in the formula: $300 / f$ (in MHz)
- D. By substituting the desired operating frequency for f in the formula: $468 / f$ (in MHz)

336. What is the approximate length (in feet) of a quarter-wavelength vertical antenna for 3725 kHz? [2I-2.1]

- A. 20 ft
- B. 32 ft
- C. 40 ft
- D. 63 ft

337. What is the approximate length (in feet) of a quarter-wavelength vertical antenna for 7125 kHz? [2I-2.2]

- A. 11 ft
- B. 16 ft
- C. 21 ft
- D. 33 ft

338. What is the approximate length (in feet) of a quarter-wavelength vertical antenna for 21,125 kHz? [2I-2.3]

- A. 7 ft
- B. 11 ft
- C. 14 ft
- D. 22 ft

339. What is the approximate length (in feet) of a quarter-wavelength vertical antenna for 28,150 kHz? [2I-2.4]

- A. 5 ft
- B. 8 ft
- C. 11 ft
- D. 17 ft

340. When a vertical antenna is lengthened, what happens to its resonant frequency? [2I-2.5]
- A. It decreases
 - B. It increases
 - C. It stays the same
 - D. It doubles
341. Why do many amateurs use a 5/8-wavelength vertical antenna rather than a 1/4-wavelength vertical antenna for their VHF or UHF mobile stations? [2I-3.1]
- A. A 5/8-wavelength antenna can handle more power than a 1/4-wavelength antenna
 - B. A 5/8-wavelength antenna has more gain than a 1/4-wavelength antenna
 - C. A 5/8-wavelength antenna exhibits less corona loss than a 1/4-wavelength antenna
 - D. A 5/8-wavelength antenna looks more like a CB antenna, so it does not attract as much attention as a 1/4-wavelength antenna
342. What type of radiation pattern is produced by a 5/8-wavelength vertical antenna? [2I-3.2]
- A. A pattern with most of the transmitted signal concentrated in two opposite directions
 - B. A pattern with the transmitted signal going equally in all compass directions, with most of the radiation going high above the horizon
 - C. A pattern with the transmitted signal going equally in all compass directions, with most of the radiation going close to the horizon
 - D. A pattern with more of the transmitted signal concentrated in one direction than in other directions
343. What type of antenna produces a radiation pattern with more of the transmitted signal concentrated in a particular direction than in other directions? [2I-4-1.1]
- A. A dipole antenna
 - B. A vertical antenna
 - C. An isotropic antenna
 - D. A beam antenna
344. What type of radiation pattern is produced by a Yagi antenna? [2I-4-1.2]
- A. A pattern with the transmitted signal spread out equally in all compass directions
 - B. A pattern with more of the transmitted signal concentrated in one direction than in other directions
 - C. A pattern with most of the transmitted signal concentrated in two opposite directions
 - D. A pattern with most of the transmitted signal concentrated at high radiation angles
345. Approximately how long (in wavelengths) is the driven element of a Yagi antenna? [2I-4-1.3]
- A. 1/4 wavelength
 - B. 1/3 wavelength
 - C. 1/2 wavelength
 - D. 1 wavelength
346. On the Yagi antenna shown in Figure 2I-4, what is the name of section B? [2I-4-2.1]
- A. Director
 - B. Reflector
 - C. Boom
 - D. Driven element
347. On the Yagi antenna shown in Figure 2I-4, what is the name of section C? [2I-4-2.2]
- A. Director
 - B. Reflector
 - C. Boom
 - D. Driven element
348. On the Yagi antenna shown in Figure 2I-4, what is the name of section A? [2I-4-2.3]
- A. Director
 - B. Reflector
 - C. Boom
 - D. Driven element
349. What are the names of the elements in a 3-element Yagi antenna? [2I-4-2.4]
- A. Reflector, driven element and director
 - B. Boom, mast and reflector
 - C. Reflector, base and radiator
 - D. Driven element, trap and feed line
350. How should the antenna on a hand-held transceiver be positioned while you are transmitting? [2I-5.1]
- A. Away from your head and away from others standing nearby
 - B. Pointed in the general direction of the repeater or other station you are transmitting to
 - C. Pointed in a general direction 90 degrees away from the repeater or other station you are transmitting to
 - D. With the top of the antenna angled down slightly to take the most advantage of ground reflections

One (1) question should be from the following:

343. What type of antenna produces a radiation pattern with more of the transmitted signal concentrated in a particular direction than in other directions? [2I-4-1.1]
- A. A dipole antenna
 - B. A vertical antenna
 - C. An isotropic antenna
 - D. A beam antenna
344. What type of radiation pattern is produced by a Yagi antenna? [2I-4-1.2]
- A. A pattern with the transmitted signal spread out equally in all compass directions
 - B. A pattern with more of the transmitted signal concentrated in one direction than in other directions
 - C. A pattern with most of the transmitted signal concentrated in two opposite directions
 - D. A pattern with most of the transmitted signal concentrated at high radiation angles

351. Why should you always locate your antennas so that no one can come in contact with them while you are transmitting? [2I-5.2]

- A. Such contact can detune the antenna, causing television interference
- B. To prevent RF burns and excessive exposure to RF energy
- C. The antenna is more likely to radiate harmonics when it is touched
- D. Such contact may reflect the transmitted signal back to the transmitter, damaging the final amplifier

352. You are going to purchase a new antenna for your VHF or UHF hand-held radio. Which type of antenna is the best choice to produce a radiation pattern that will be least hazardous to your face and eyes? [2I-5.3]

- A. A 1/8-wavelength whip
- B. A 7/8-wavelength whip
- C. A 1/2-wavelength whip
- D. A short, helically wound, flexible antenna

One (1) question should be from the following:

353. What is a coaxial cable? [2I-6.1]

- A. Two parallel conductors encased along the edges of a flat plastic ribbon
- B. Two parallel conductors held at a fixed distance from each other by insulating rods
- C. Two conductors twisted around each other in a double spiral
- D. A center conductor encased in insulating material which is covered by a conducting sleeve or shield

354. What kind of antenna feed line is constructed of a center conductor encased in insulation which is then covered by an outer conducting shield and weatherproof jacket? [2I-6.2]

- A. Twin lead
- B. Coaxial cable
- C. Open-wire feed line
- D. Wave guide

355. What are some advantages of using coaxial cable as an antenna feed line? [2I-6.3]

- A. It is easy to make at home, and it has a characteristic impedance in the range of most common amateur antennas
- B. It is weatherproof, and it has a characteristic impedance in the range of most common amateur antennas
- C. It can be operated at a higher SWR than twin lead, and it is weatherproof
- D. It is unaffected by nearby metallic objects, and has a characteristic impedance that is higher than twin lead

356. What commonly-available antenna feed line can be buried directly in the ground for some distance without adverse effects? [2I-6.4]

- A. Twin lead
- B. Coaxial cable
- C. Parallel conductor
- D. Twisted pair

357. When an antenna feed line must be located near grounded metal objects, which commonly-available feed line should be used? [2I-6.5]

- A. Twisted pair
- B. Twin lead
- C. Coaxial cable
- D. Ladder-line

358. What is parallel-conductor feed line? [2I-7.1]

- A. Two conductors twisted around each other in a double spiral
- B. Two parallel conductors held a uniform distance apart by insulating material
- C. A conductor encased in insulating material which is then covered by a conducting shield and a weatherproof jacket
- D. A metallic pipe whose diameter is equal to or slightly greater than the wavelength of the signal being carried

359. How can TV-type twin lead be used as a feed line? [2I-7.2]

- A. By carefully running the feed line parallel to a metal post to ensure self resonance
- B. TV-type twin lead cannot be used in an amateur station
- C. By installing an impedance-matching network between the transmitter and feed line
- D. By using a high-power amplifier and installing a power attenuator between the transmitter and feed line

360. What are some advantages of using parallel-conductor feed line? [2I-7.3]

- A. It has a lower characteristic impedance than coaxial cable, and will operate at a higher SWR than coaxial cable
- B. It will operate at a higher SWR than coaxial cable, and it is unaffected by nearby metal objects
- C. It has a lower characteristic impedance than coaxial cable, and has less loss than coaxial cable
- D. It will operate at higher SWR than coaxial cable and it has less loss than coaxial cable

361. What are some disadvantages of using parallel-conductor feed line? [2I-7.4]

- A. It is affected by nearby metallic objects, and it has a characteristic impedance that is too high for direct connection to most amateur transmitters
- B. It is more difficult to make at home than coaxial cable and it cannot be operated at a high SWR
- C. It is affected by nearby metallic objects, and it cannot handle the power output of a typical amateur transmitter
- D. It has a characteristic impedance that is too high for direct connection to most amateur transmitters, and it will operate at a high SWR

362. What kind of antenna feed line is constructed of two conductors maintained a uniform distance apart by insulated spreaders? [2I-7.5]

- A. Coaxial cable
- B. Ladder-line open conductor line
- C. Twin lead in a plastic ribbon
- D. Twisted pair

363. A certain antenna has a feed-point impedance of 35 ohms. You want to use a 50-ohm-impedance coaxial cable to feed this antenna. What type of device will you need to connect between the antenna and the feed line? [2I-8.1]

- A. A balun
- B. An SWR bridge
- C. An impedance matching device
- D. A low-pass filter

364. A certain antenna system has an impedance of 1000 ohms on one band. What must you use to connect this antenna system to the 50-ohm output on your transmitter? [2I-8.2]

- A. A balun
- B. An SWR bridge
- C. An impedance matching device
- D. A low-pass filter

365. The word balun is a contraction for what phrase? [2I-9.1]

- A. Balanced-antenna-lobe use network
- B. Broadband-amplifier linearly unregulated
- C. Balanced unmodulator
- D. Balanced to unbalanced

366. Where would you install a balun if you wanted to feed your dipole antenna with 450-ohm parallel-conductor feed line? [2I-9.2]

- A. At the transmitter end of the feed line
- B. At the antenna feed point
- C. In only one conductor of the feed line
- D. From one conductor of the feed line to ground

367. Where might you install a balun if you wanted to feed your dipole antenna with 50-ohm coaxial cable? [2I-9.3]

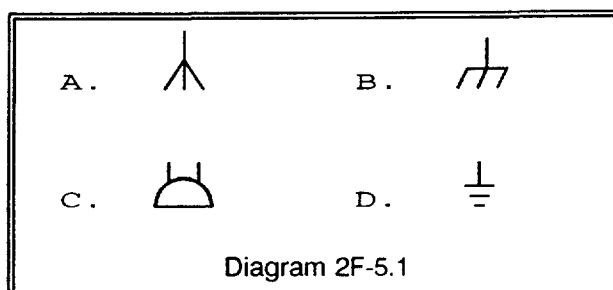
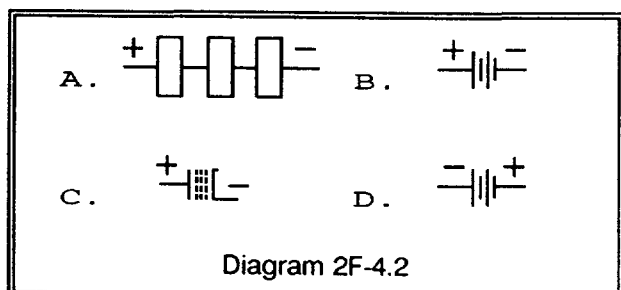
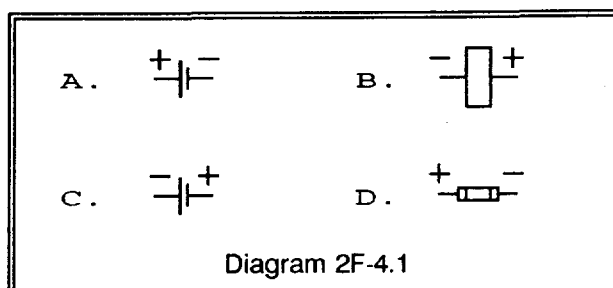
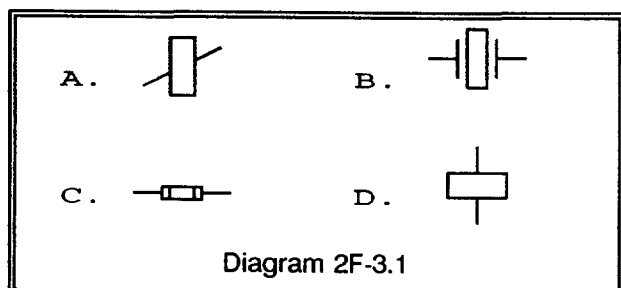
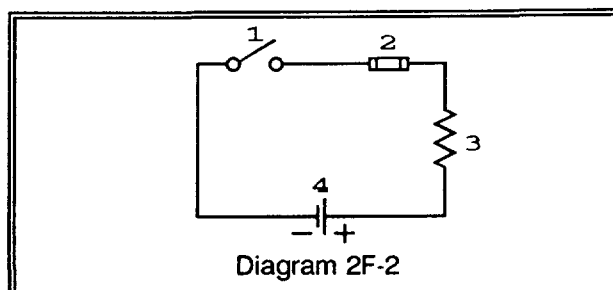
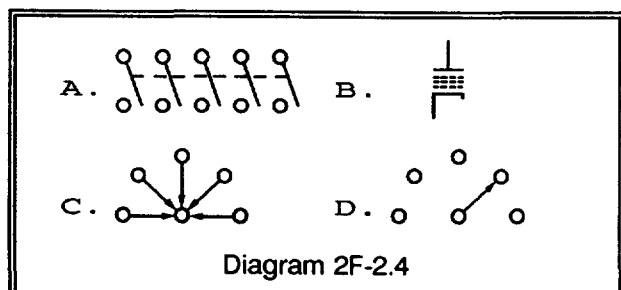
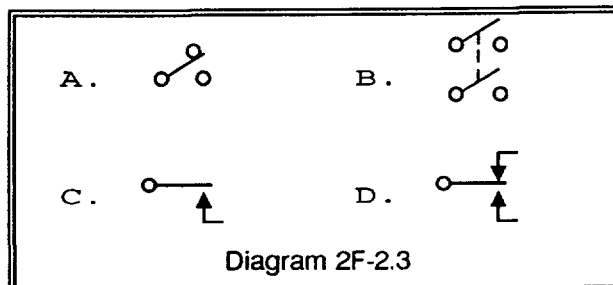
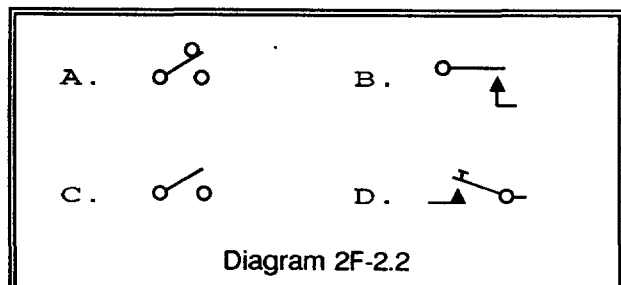
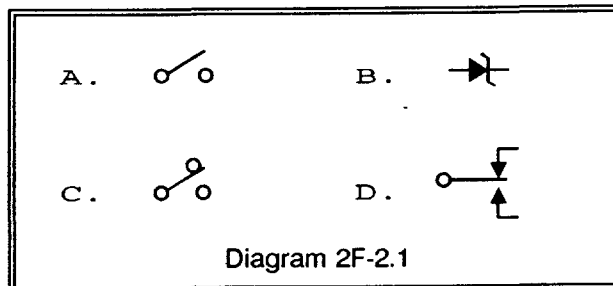
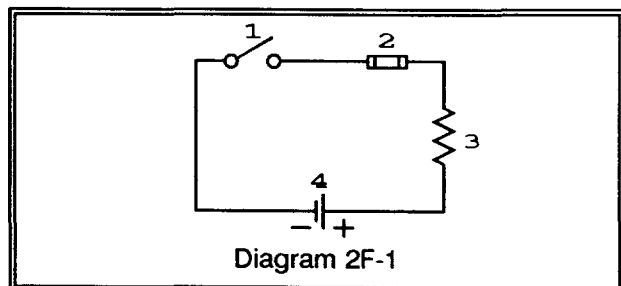
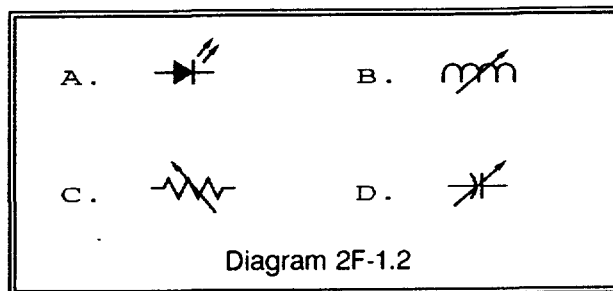
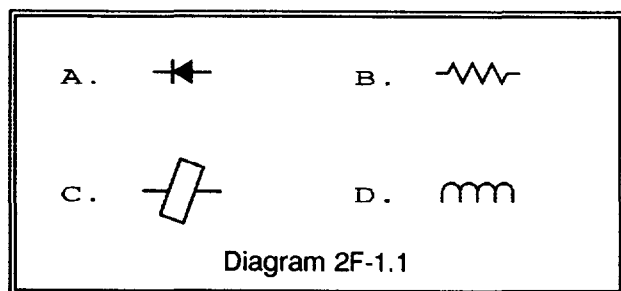
- A. You might install a balun at the antenna feed point
- B. You might install a balun at the transmitter output
- C. You might install a balun 1/2 wavelength from the transmitter
- D. You might install baluns in the middle of each side of the dipole

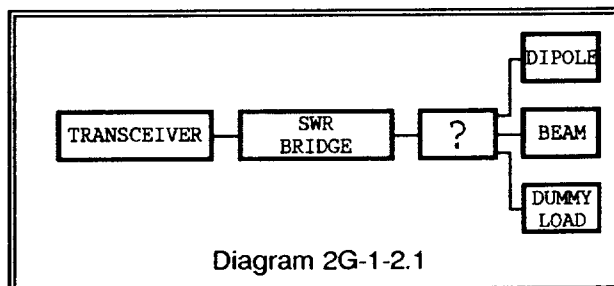
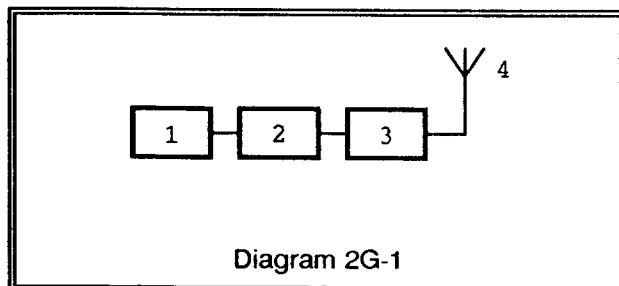
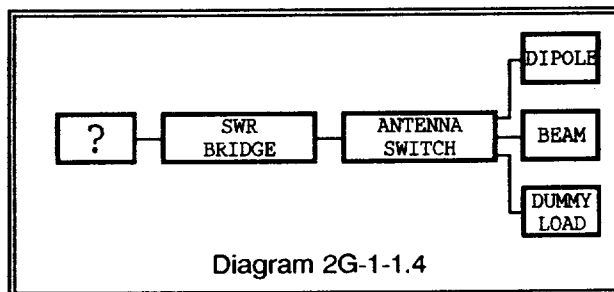
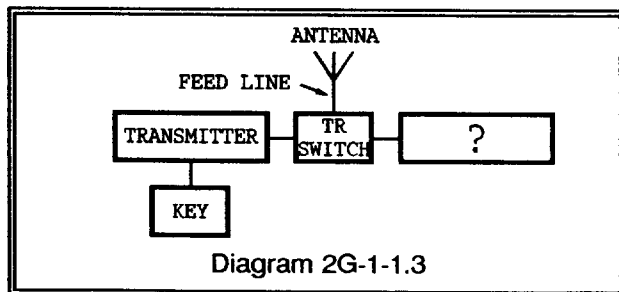
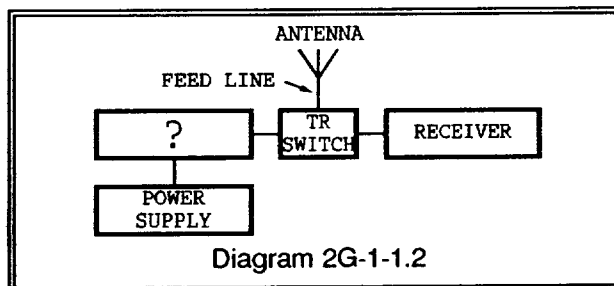
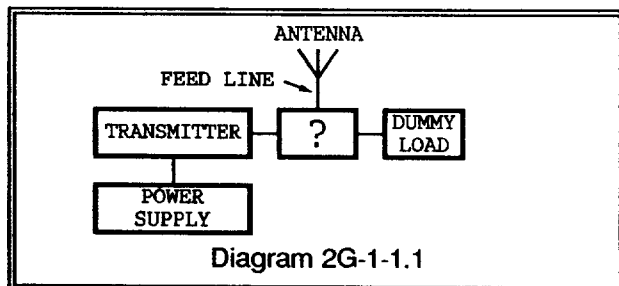
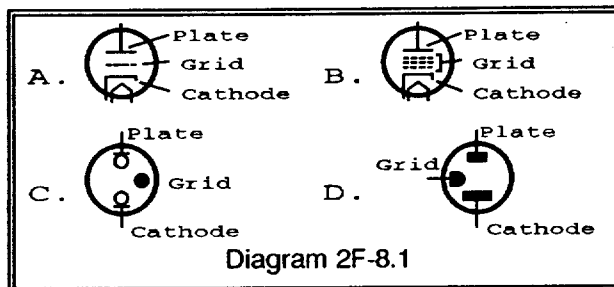
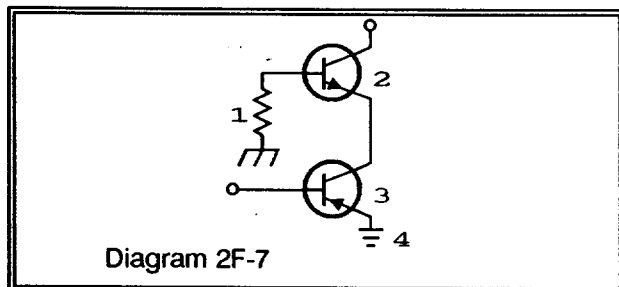
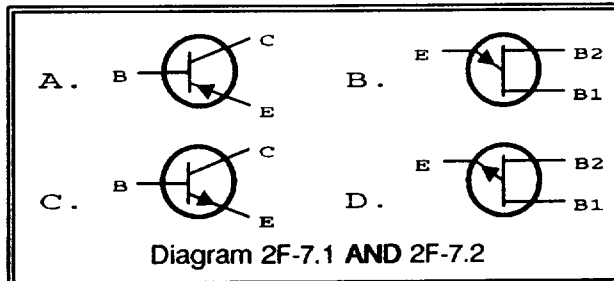
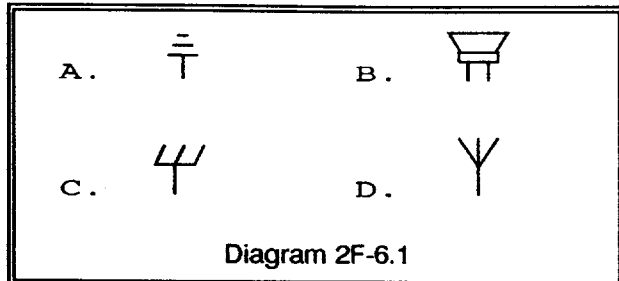
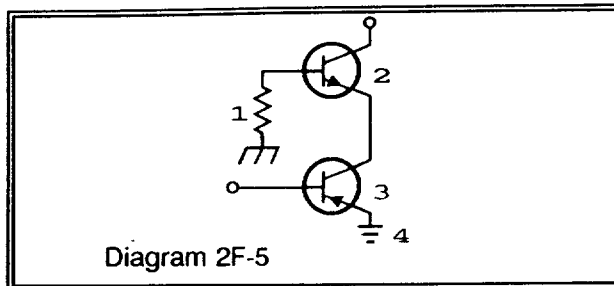
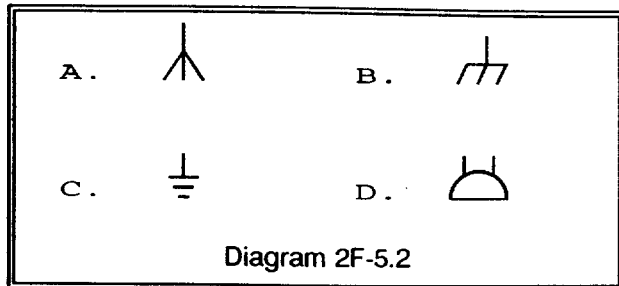
368. A four-element Yagi antenna is mounted with its elements parallel to the ground. A signal produced by this antenna will have what type of polarization? [2I-10-1.1]

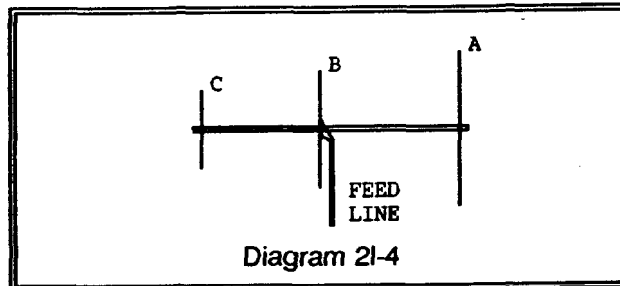
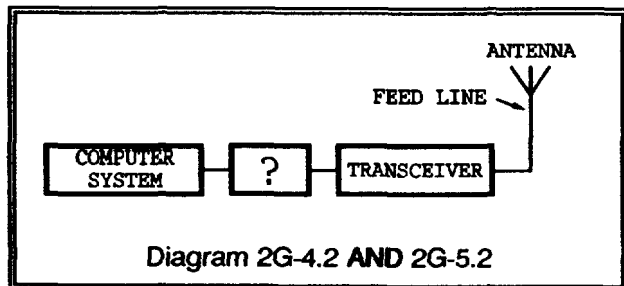
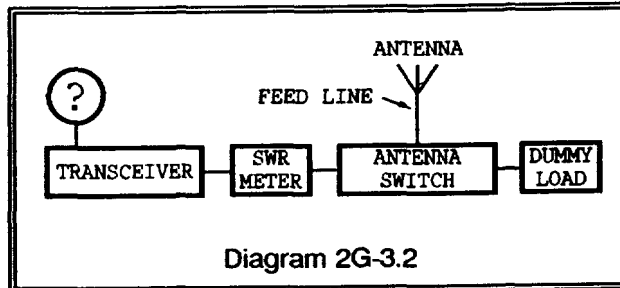
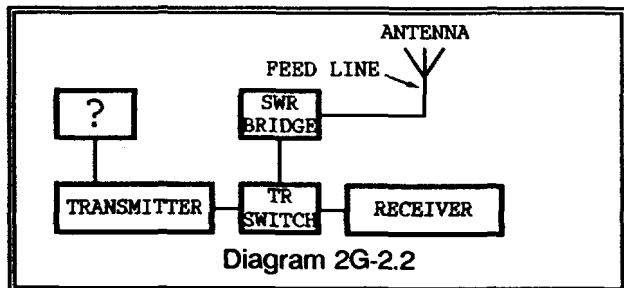
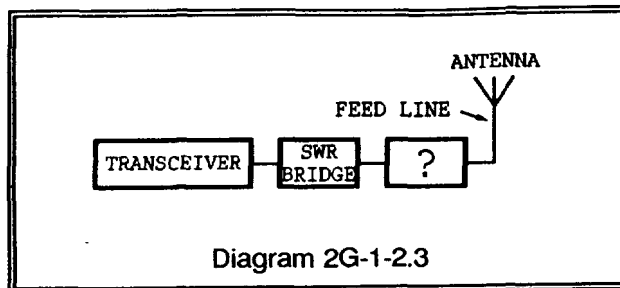
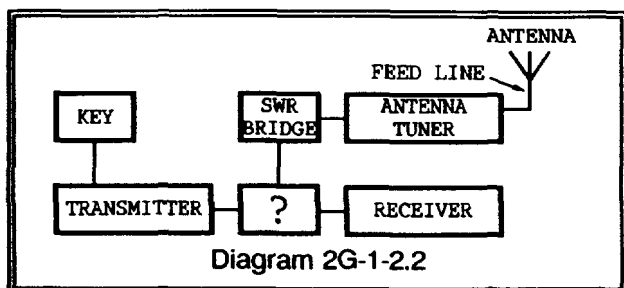
- A. Broadside polarization
- B. Circular polarization
- C. Horizontal polarization
- D. Vertical polarization

369. A four-element Yagi antenna is mounted with its elements perpendicular to the ground. A signal produced by this antenna will have what type of polarization? [2I-11-1.1]

- A. Broadside polarization
- B. Circular polarization
- C. Horizontal polarization
- D. Vertical polarization







- | | | |
|------------------|-------------------|--------------------|
| 1. A [2A-1.1] | 63. B [2A-19.5] | 125. A [2B-2-4.2] |
| 2. D [2A-1.2] | 64. C [2A-20.1] | 126. A [2B-2-4.3] |
| 3. D [2A-1.3] | 65. C [2A-20.2] | 127. D [2B-2-5.1] |
| 4. B [2A-1.4] | 66. D [2A-20.3] | 128. B [2B-2-5.2] |
| 5. C [2A-2.1] | 67. C [2A-21.1] | 129. A [2B-2-5.3] |
| 6. A [2A-2.2] | 68. A [2A-21.2] | 130. B [2B-2-6.1] |
| 7. A [2A-3.1] | 69. D [2A-21.3] | 131. C [2B-2-6.2] |
| 8. D [2A-3.2] | 70. B [2A-21.4] | 132. D [2B-2-6.3] |
| 9. B [2A-4.1] | 71. C [2A-22.1] | 133. A [2B-2-6.4] |
| 10. D [2A-4.2] | 72. A [2A-22.2] | 134. B [2B-2-6.5] |
| 11. C [2A-5.1] | 73. B [2A-23.1] | 135. C [2B-3-1.1] |
| 12. B [2A-5.2] | 74. B [2A-24.1] | 136. D [2B-3-1.2] |
| 13. B [2A-6.1] | 75. C [2A-25.1] | 137. A [2B-3-2.1] |
| 14. C [2A-6.2] | 76. D [2A-26.1] | 138. C [2B-3-2.2] |
| 15. D [2A-7.1] | 77. C [2A-27.1] | 139. A [2B-3-2.3] |
| 16. A [2A-8.1] | 78. B [2A-27.2] | 140. D [2B-3-2.4] |
| 17. D [2A-8.2] | 79. B [2A-27.3] | 141. A [2B-3-2.5] |
| 18. D [2A-9.1] | 80. A [2A-27.4] | 142. C [2B-3-2.6] |
| 19. B [2A-9.3] | 81. B [2A-27.5] | 143. A [2B-3-2.7] |
| 20. C [2A-10.2] | 82. C [2A-27.6] | 144. D [2B-3-2.8] |
| 21. A [2A-10.3] | 83. B [2A-27.7] | 145. B [2B-3-2.9] |
| 22. C [2A-10.4] | 84. D [2A-28.1] | 146. A [2B-3-2.10] |
| 23. B [2A-10.5] | 85. C [2A-28.2] | 147. C [2B-3-2.11] |
| 24. C [2A-10.6] | 86. B [2A-29.1] | 148. B [2B-4-1.1] |
| 25. A [2A-10.7] | 87. D [2A-29.2] | 149. B [2B-4-2.1] |
| 26. B [2A-10.8] | 88. A [2A-30.1] | 150. C [2B-5-1.1] |
| 27. C [2A-10.9] | 89. B [2A-30.2] | 151. D [2B-5-1.2] |
| 28. D [2A-10.10] | 90. D [2A-30.3] | 152. A [2B-5-2.1] |
| 29. A [2A-11.1] | 91. D [2A-31.1] | 153. B [2B-5-2.2] |
| 30. B [2A-11.2] | 92. A [2A-32.1] | 154. C [2B-6-1.1] |
| 31. C [2A-12.1] | 93. D [2A-32.2] | 155. D [2B-6-2.1] |
| 32. A [2A-12.2] | 94. A [2A-33.1] | 156. A [2B-6-3.1] |
| 33. D [2A-12.3] | 95. A [2A-34.1] | 157. B [2B-6-4.1] |
| 34. A [2A-13.1] | 96. B [2A-34.2] | 158. C [2B-6-5.1] |
| 35. B [2A-14.1] | 97. D [2A-34.3] | 159. D [2B-6-5.2] |
| 36. C [2A-15.1] | 98. A [2A-35.1] | 160. A [2C-1.1] |
| 37. D [2A-15.2] | 99. C [2A-36.1] | 161. B [2C-1.2] |
| 38. A [2A-15.3] | 100. D [2A-36.2] | 162. D [2C-2.1] |
| 39. B [2A-15.4] | 101. A [2A-37.1] | 163. B [2C-2.2] |
| 40. D [2A-15.5] | 102. C [2A-37.2] | 164. B [2C-2.3] |
| 41. A [2A-16.1] | 103. C [2A-38.1] | 165. A [2C-2.4] |
| 42. A [2A-17.1] | 104. D [2A-38.2] | 166. A [2C-3.1] |
| 43. A [2A-17.2] | 105. A [2A-38.3] | 167. B [2C-3.2] |
| 44. A [2A-17.3] | 106. C [2A-39.1] | 168. D [2C-3.3] |
| 45. A [2A-17.4] | 107. B [2A-39.2] | 169. A [2C-3.4] |
| 46. D [2A-17.6] | 108. B [2A-39.3] | 170. C [2C-3.5] |
| 47. D [2A-17.7] | 109. C [2A-40.1] | 171. D [2C-3.6] |
| 48. C [2A-17.8] | 110. D [2A-40.2] | 172. C [2C-4.1] |
| 49. C [2A-17.9] | 111. D [2A-40.3] | 173. D [2C-4.2] |
| 50. D [2A-17.10] | 112. A [2B-1-1.1] | 174. A [2C-5.1] |
| 51. D [2A-17.11] | 113. C [2B-1-1.2] | 175. B [2C-5.2] |
| 52. D [2A-17.12] | 114. C [2B-1-1.3] | 176. C [2C-6.1] |
| 53. C [2A-17.13] | 115. D [2B-1-2.1] | 177. C [2C-6.2] |
| 54. D [2A-18.1] | 116. A [2B-2-1.1] | 178. B [2D-1.1] |
| 55. C [2A-18.2] | 117. B [2B-2-1.2] | 179. A [2D-1.2] |
| 56. C [2A-18.3] | 118. C [2B-2-2.1] | 180. D [2D-2.1] |
| 57. C [2A-18.4] | 119. C [2B-2-3.1] | 181. C [2D-2.2] |
| 58. C [2A-18.5] | 120. D [2B-2-3.2] | 182. D [2D-2.3] |
| 59. C [2A-19.1] | 121. A [2B-2-3.3] | 183. B [2D-2.4] |
| 60. B [2A-19.2] | 122. B [2B-2-3.4] | 184. A [2D-3.1] |
| 61. C [2A-19.3] | 123. C [2B-2-3.5] | 185. C [2D-3.2] |
| 62. D [2A-19.4] | 124. D [2B-2-4.1] | 186. B [2D-3.3] |